



# Frontiers

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## Field of view

Anytime and anywhere,  
Boeing field service reps are  
there to help customers

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FSC LOGO

## ADVERTISEMENTS

The stories behind the ads in this issue of *Frontiers*.

### 03



This new Growler ad illustrates the impact of the aircraft's production line on the U.S. economy and national security. Part of a campaign to generate support for adding Growlers to the U.S. president's budget for fiscal year 2015, this ad appears in local news, trade and political publications and encourages readers to visit [www.supportgrowler.com](http://www.supportgrowler.com) to sign and submit a petition or letter to Congress to show their support.

### 06



This ad shows Boeing's appreciation for and gratitude toward the U.S. armed forces. It will run in *The Washington Post* and *The Seattle Times*, as well as in regional, trade and military publications, over the U.S. Memorial Day holiday. Boeing will air a similarly themed commercial on the *Meet the Press* television program.

### 14-15



This ad congratulates recipients of Boeing's 2013 Supplier of the Year awards.

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Part of the "Boeing & Brazil. Endless Opportunities" campaign, this ad focuses on Boeing's support for biofuels in Brazil. Translated the text reads: "A partner to Brazil for more than 80 years, Boeing is committed to improving the environment of Brazil and the world by developing sustainable biofuels for aviation."

## ETHICS QUESTIONS

You can reach the Office of Ethics & Business Conduct at 888-970-7171; fax: 888-970-5330; website: [ethics.whq.boeing.com](http://ethics.whq.boeing.com).

## IAM PROMOTIONS

No promotions listed for periods ending March 28 and April 4, 11 and 18.

## SUBSCRIPTIONS

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# The Growler protects our warfighters.

# Now Congress can protect the Growler.



The EA-18G Growler is America's only electronic attack aircraft in production. By disabling enemy defense systems, it ensures America's combat aircraft can perform their missions safely. But now, the Growler's in danger. Without funding for new Growlers, the production line will close at the end of 2016, leaving the U.S. Navy without future Growlers. Closing the line would also affect nearly 60,000 jobs around the country and leave the military without competing sources for additional fighter aircraft.

The time to act is now. We urge Congress to include funding for Growlers in the 2015 budget. It's an invaluable investment in the safety of our warfighters, the strength of our nation's air power and industrial resource.

To learn more, go to [www.supportgrowler.com](http://www.supportgrowler.com)



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Their mission is to be where they are needed, when they are needed, in support of Boeing customers and products around the world. Boeing field service representatives are a dedicated group of employees with special skills and numbering in the hundreds. Meet some of them in this *Frontiers* feature.

**COVER:** GARY GRUWELL, A BOEING FIELD SERVICE REPRESENTATIVE, SUPPORTS THE GROUND-BASED MIDCOURSE DEFENSE SYSTEM IN FORT GREELY, ALASKA. THE DOMES HOLD A MISSILE DEFENSE COMMUNICATION SYSTEM. ASSOCIATED PRESS

**PHOTO:** BOEING FIELD SERVICE REPRESENTATIVE EUNJEONG BAHN, SHOWN OUTSIDE A HANGAR AT DAEGU AIR BASE, SOUTH KOREA, SUPPORTS F-15K FIGHTERS FOR THE REPUBLIC OF KOREA AIR FORCE. ASSOCIATED PRESS





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Boeing mechanics use many tools, such as torque wrenches and screw guns, to assemble the company's products with exacting precision. Helping keep those tools properly calibrated is a new analytics program—which predicts future tool performance. PHOTO: BOB FERGUSON/BOEING



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Boeing is helping customers better understand their defense capabilities and needs by creating complex scenarios at specialized facilities around the world. The situations are simulated, but the learnings are real. PHOTO: ASSOCIATED PRESS



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To increase the value—and competitiveness—of Boeing products, suppliers must be as vigilant as Boeing in looking for ways to reduce costs and streamline operations. Partnering for Success is producing significant results, which means more business for everyone. PHOTO: BOB FERGUSON/BOEING



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Considered world-class authorities in their fields, Boeing Senior Technical Fellows are at the upper echelon of the company's technical workforce. Meet the newest six, whose expertise ranges from jet propulsion to the language of machines. PHOTO: BOB FERGUSON/BOEING

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These are the places we remember,  
to honor the lives of those we'll never forget.



# Designing for value

Balancing airplane capability with cost will keep Boeing competitive for the long haul

Boeing has long prided itself on building the best commercial airplanes in the world, but today's hyper-competitive marketplace calls for a new equation: Going forward, we must develop the world's best airplanes and offer them at a lower price than we do today.

We've already taken the first steps.

Over the past 18 months, since Airplane Development was established as an organization, we've been focusing on initiatives to improve the affordability of our development programs and to make our products more cost-competitive. We've made substantial progress on both fronts that enabled us to launch the 777X and the 787-10.

But the biggest gains are still to come, and we have to get it right because the stakes are high. Global demand for new jetliners over the next

20 years represents a \$4.8 trillion opportunity. Our commercial development programs—737 MAX, 777X, 787-9 and 787-10—are vying for a \$2.5 trillion share of that potential market.

Price is only one factor—but an important one—in sealing a deal. To win in this “more for less” world we also must consistently bring the highest-value product to market when our customers need it. In Airplane Development we're using a management framework called the Boeing Product Development System to help us accomplish all of those goals.

We're standardizing processes, using tailored metrics and striving for more design commonality across our development airplanes. We're innovating when it delivers differentiating value for the customer, and setting aggressive improvement targets.

We're also recommitting to first-pass engineering quality. As with all other aspects of our business, getting it right the first time promises huge cost savings and schedule benefits.

Most of all, we're challenging ourselves to change our mindset. For example, we're simplifying design requirements, using fewer parts and less complexity to

achieve design elegance. The result is lower production costs for Boeing, and lower prices and operating costs for our customers.

We're implementing this new approach in partnership with organizations across Commercial Airplanes and throughout the enterprise, including Engineering, Operations & Technology and Boeing Defense, Space & Security. By working together and holding one another accountable we can create a powerful design environment that boosts our competitiveness.

This approach requires a substantial shift in our culture, but it's a change we have to make. Development costs have been climbing steeply for decades and are affecting our ability to compete.

The Boeing Product Development System offers a solution. We're already seeing cost reductions from these new approaches, and we anticipate many more gains to come. We'll continue to focus on value and efficiency initiatives as we plan for the next generation of commercial airplanes and reposition our product line for the future.

Together, we're breaking the development cost curve—and positioning Boeing for a future of unlimited success. ■

PHOTO: BOB FERGUSON/BOEING



Scott Fancher

Senior vice president and general manager,  
Airplane Development,  
Boeing Commercial Airplanes

## SNAPSHOT

# Where Eagles dare

Two Boeing F-15E Strike Eagles await maintenance checks after a busy day participating in a Red Flag exercise at Nellis Air Force Base, Nev. The fighters, assigned to the 391st Fighter Squadron, Mountain Home AFB, Idaho, were some of more than 125 aircraft and 3,200 U.S. and allied service members participating in Exercise Red Flag 14-1 earlier this year. The objective of the exercise is to increase capabilities to defend against future threats. PHOTO: U.S. AIR FORCE







## QUOTABLES

“It will instill a sense of pride in Kiwis and turn heads when it touches down at airports throughout Asia and the Pacific.”

—Capt. David Morgan, Air New Zealand chief flight operations and safety officer, after Boeing rolled out the airline’s first 787-9, in special all-black livery, from the Everett, Wash., paint shop. Air New Zealand is a launch customer for the 787-9. [seattlepi.com](http://seattlepi.com), April 5

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“Boeing has shown that 10-kilowatt lasers are capable of destroying mortars, unmanned aerial vehicles and small-boat threats.”

—Dave DeYoung, Boeing program manager, explaining directed energy capabilities at an exhibition in Washington, D.C. Boeing has worked with the U.S. Army and Navy to design and test laser weapon systems. *Boeing News Now*, April 9

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“The measures we were able to get on signature reduction and flying quality were spot on predications.”

—Capt. Frank Morley, F/A-18 program manager for the U.S. Navy, talking to reporters about flight-testing Boeing’s Advanced Super Hornet, which has upgrades including increased “stealth” (lower visibility to radar). [FlightGlobal.com](http://FlightGlobal.com), April 7



## Carlos Guzman

HAS WORKED FOR BOEING:

9 years

ORGANIZATION:

Boeing Research  
& Technology

HAS BEEN PART OF A TEAM  
BUILDING INNOVATIVE  
FUEL TANKS:

4 years

# Fueling the imagination

This engineer is helping build rocket fuel tanks like none before

By Nathan A. Hulings and photo by Marian Lockhart

Carlos Guzman is a manufacturing research and development engineer for Boeing Research & Technology in Seattle. In this *Frontiers* series that profiles employees discussing their jobs, Guzman explains his work on a project that can dramatically reduce the weight of rocket fuel tanks by using composite technology, and how collaboration and hard work pay off.

I came to Boeing nine years ago hoping to work on challenging programs and learn from some of the best engineers in the world. Have I ever.

During the past four years, I've been part of a team that is building something that has never been built before at this scale. I'm co-manufacturing lead on NASA's Composite Cryotank Technologies and Demonstration contract, under which Boeing designed and built two all-composite fuel tanks for use on next-generation heavy launch space vehicles. In March, the larger tank was shipped to Marshall Space Flight Center in Huntsville, Ala., where it is undergoing testing. If implemented, this technology can reduce fuel tank weight by 30 percent, cost by 25 percent, and increase payload capability on future human space exploration missions beyond low Earth orbit.

Building two all-composite fuel tanks (about 8 and 18 feet, or 2.4 and 5.5 meters, in diameter) consecutively in a 29-month time period seemed like a daunting task. But we were up for the challenge.

Boeing makes a lot of large-scale commercial and military products, so our team had all the tools in

place to plan and successfully perform. However, several of the tank's components still required extensive on-the-fly development, especially on the smaller tank. This gave us several exciting, stressful and challenging moments.

As an engineer working countless hours dealing with unexpected challenges, I often forget to step back from my work and appreciate the magnitude of what's being accomplished. For me, that moment didn't occur until I started reading news articles about the program, talking about our work during visits by senior management, and seeing a large photo in the Huntsville airport showing off our robotic operation. It was then that I realized our team was creating something special.

Ask any of the dozens of people who have worked the program and they'll tell you the road has not been easy or predictable. We've spent sleepless nights and given up numerous weekends and holidays working to meet major milestones and an aggressive schedule.


As a manufacturing lead, I am pulled in numerous directions every day. I love the fact that my job allows me to offset scheduling and budgeting tasks with hands-on factory-floor work.

When our work pushes the envelope, Boeing employees kick into overdrive and work together toward a common goal. Building strong professional and personal relationships helps get the job done and provides a foundation for future efforts.

I'm very fortunate to work within a facility that has some of the most advanced lab resources, equipment and, most important, skilled professionals. Those of us on this program have a common vision and trust one another to apply our own unique skills and expertise. I'm learning things I never dreamed I'd need to know at this stage of my career. I feel like I'm getting 10 years of experience in two. At this point, in what I hope is a long career at Boeing, I am honored that management and my fellow employees gave me the opportunity to oversee the job.

Boeing engineers helped put a man on the moon. Hopefully, our work will open new business opportunities for Boeing and help fuel the aspirations of and motivate the next generation of scientists, engineers and space explorers. ■

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HISTORICAL PERSPECTIVE

# End of a LEGACY

Last passenger flight of the DC-10  
closes a chapter in Douglas aviation history

*By Mike Lombardi*



PHOTOS: (Clockwise from far left) The first DC-10 rolls out in July 1970 at the Douglas plant in Long Beach, Calif.; James S. McDonnell, from left, Vice President Spiro Agnew and Donald W. Douglas advance throttles to signal the start of rollout of the first DC-10; a KC-10, the U.S. Air Force Tanker version of the DC-10, flies with Douglas A-4 Skyhawks of the U.S. Navy Blue Angels demonstration team. BOEING ARCHIVES Biman's DC-10-30 arrives at the Birmingham, England, airport, ending a chapter in aviation history. BIMAN BANGLADESH AIRLINES

On July 23, 1970, a typical sunny California summer day at the Douglas Long Beach plant, more than a thousand employees and guests, including then-California Gov. Ronald Reagan, gathered for a not very typical celebration.

It was 50 years and one day after Donald Douglas had started the airplane company that carried his name. Bagpipers, acknowledging the Scottish heritage of Douglas as well as his new business partner James S. McDonnell, ceremoniously led a new plane with the Douglas name out from Building 54.

There was high enthusiasm for the new DC-10, and great hope that accompanies the completion of a design process that revealed not only a beautiful new airplane but one that promised to continue one of the world's most famous families of commercial airplanes. It had started in 1935 when the DC-2 and the DC-3 captured the air travel market. And in the post-World War II era, the DC-4, DC-6 and DC-7 ruled the skies.

The DC-10, however, would mark the end of a Douglas legacy—there would be no more all-new DC designs.

For four decades, the DC-10 has been a familiar member of the world's widebody jetliner fleet. It continues to operate as a freighter and the military uses a modified version as a refueling tanker. But the last DC-10 passenger plane in scheduled service was retired earlier this year by Biman Bangladesh Airlines. The DC-10 was the flagship of the Biman fleet for three decades; it is being replaced by Boeing's 777-300ER (Extended Range).

On Feb. 20, the remaining DC-10 in the Biman fleet, carrying 30 aviation enthusiasts and writers as well as a film crew from the British Broadcasting Corp., took off on a long-haul flight from Dhaka to Birmingham, England. The trip marked a somber farewell to the last member of a Douglas legacy.

The DC-10 originally was planned as a high-capacity, four-engine double-deck design, but with the advent of the widebody 747, the design changed to a high-capacity widebody able to fit in the same footprint as existing single-aisle jets.

Douglas designers set several basic goals for their new airplane: speed comparable to that of the 747, economy superior to that of the DC-8, low approach speed better than that of the 727, low external noise level and being able to operate from the short field and confined gates of New York's LaGuardia airport. The designers arrived at an optimum design of a three-engine, high-capacity widebody with nine-abreast seating for 250 to 340 passengers. Later, the cabin was fitted for 10-abreast seating and 380 passengers.

The first DC-10s, known as the Series 10, were built for domestic routes of up to 3,500 miles (5,600 kilometers) and were powered by General Electric CF-6 engines.

Two other major models were built for longer-range international flights.

With two-thirds the capacity of the 747, the DC-10 found success flying long-haul routes that did not need the capacity of the larger 747. In all, 386 commercial DC-10s were built in a production run that ended in 1989. Sixty KC-10 aerial refueling tanker versions added to the production total.

Unfortunately, the rollout of the DC-10 was not the continuation of the famous DC dynasty but rather its end. The new McDonnell Douglas planes that followed were all derivatives of the DC-9 or the DC-10. Those MD-11s, MD-80/90s and the 717 (initially called the MD-95 before the merger with Boeing) continue to carry the Douglas airliner legacy. And the ageless DC-3 likely will still be flying many years from now—another reminder of the genius of Donald Douglas and his incomparable commercial aviation dynasty. ■

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# Tuning to





# ols



## Predicting when tools need calibrating improves quality—and saves rework and money

By Eric Fetters-Walp and photos by Bob Ferguson

**B**oeing jetliners are packed with high technology and cutting-edge design, but it still takes torque wrenches, screw guns and other relatively low-tech tools to put them together—along with mechanics who use the tools.

And the quality of Boeing products depends, in part, on making sure these tools are properly maintained.

On the 787 program, for example, 57 different tools that are especially critical to the final assembly of the Dreamliner are calibrated every three to four days to minimize tool-related risks. While inspectors and extensive Quality Assurance processes catch work performed with tools out of calibration, preventing it from happening saves time and money.

To that end, teams in Commercial Airplanes and Engineering, Operations & Technology have developed a predictive analytics program to keep tools better calibrated and working well, which prevents costly rework that can slow production. In less than a year, the program has identified dozens of “significantly out of tolerance” (commonly referred to as SOOT) tools in Boeing’s factories and helped predict when others need to be calibrated.

“By applying the analytics model, we were able to ‘pull ahead’ a number of our out-of-tolerance tools that would have taken months to find,” said Martin Ohman, SOOT mitigation leader for Fabrication. “This saved the programs potentially millions of dollars in rework

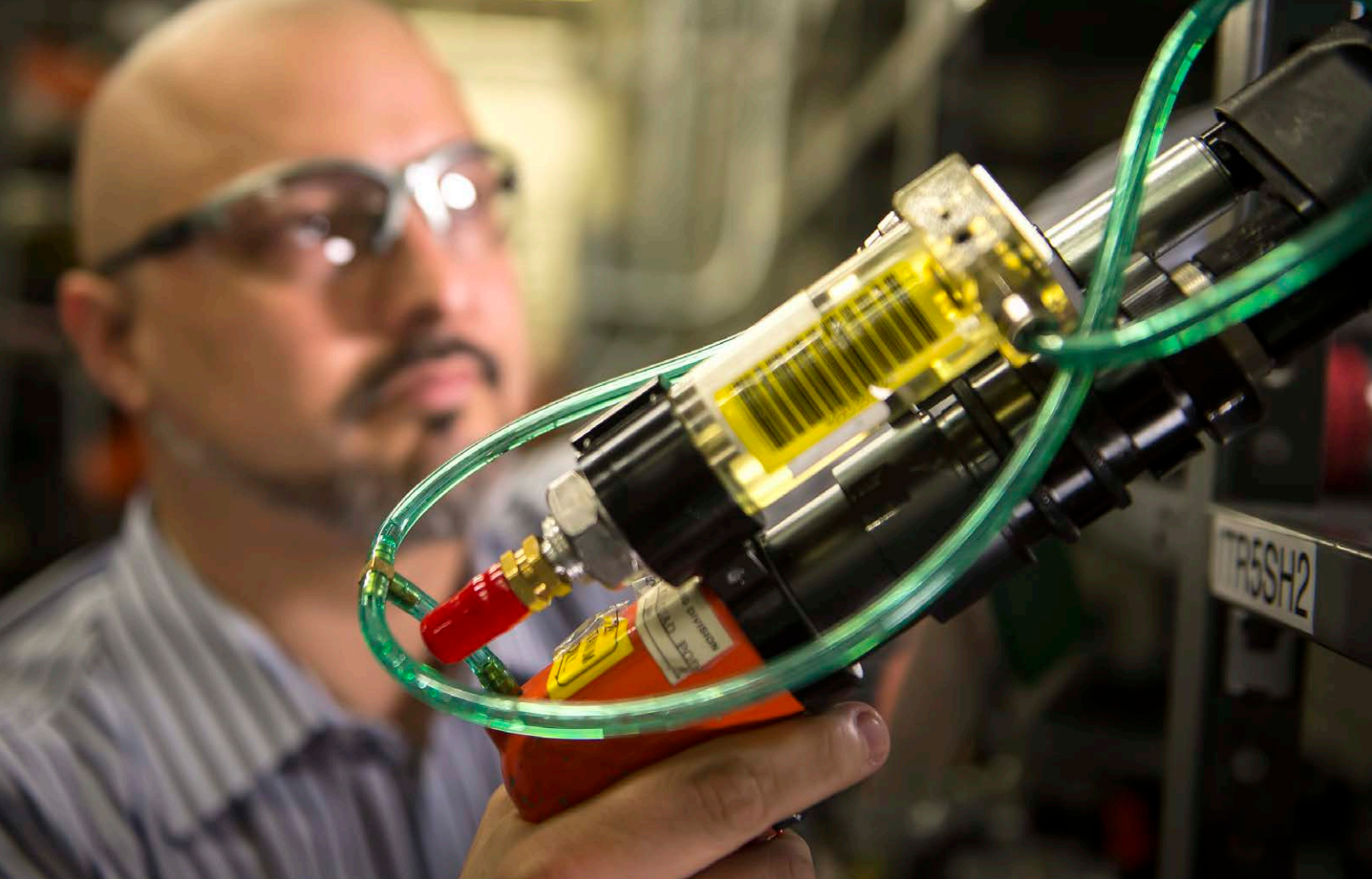
if the tools had been used to their full calibration cycle.”

The program analyzes rafts of data on the tools—how they are used and when they are prone to slip out of calibration or just wear out. In simpler terms, it builds on a concept that has proved successful in Major League Baseball. The book and film *Moneyball* tell the story of how the Oakland Athletics’ general manager used empirical analysis of player statistics, especially statistics and data patterns that previously were undervalued by other teams, to predict a player’s future performance. The Athletics have built winning teams as a result.

Boeing continues to expand its use of predictive and other advanced analytics into new areas where they might be useful, explained Paul Ortman, Manufacturing Operations Advanced Analytics manager in Commercial Airplanes. Boeing has reams of data available, and within Commercial Airplanes, it is his team’s job to figure out how to use it productively. His team worked with an Information Technology team in Huntington Beach, Calif., to create and apply specialized analytic formulas.

“They previously had no way to proactively prevent SOOTs before they

**PHOTOS:** (Far left) Commercial Airplanes’ Paul Ortman, from left, Tracie Wingrove, Alan Davis and Bobby Lohnes review tools tagged for repair or for being out of tolerance. (Above) Davis displays a nut runner.



“By applying the analytics model, we were able to ‘pull ahead’ a number of our out-of-tolerance tools ... This saved the programs potentially millions of dollars in rework.” —Martin Ohman, SOOT mitigation leader for Fabrication



happened,” said Melanie Lorang, Associate Technical Fellow and Product System Analytics program manager in Huntington Beach. “They only could see what happened and eliminate the problem tools after the fact.”

Using tools that are beyond their safe tolerance range can require rework on parts of the airplane that were touched by those tools, potentially causing expensive production rework and delays for customers. It’s happened before, said Steve Onustack, senior manager of the Metrology Lab Operations in the Puget Sound region. Metrology employees, part of Boeing Test & Evaluation, are tasked with making sure Boeing’s tools stay calibrated.

Lorang and the project’s primary IT data specialist, Irene Umamoto, along with statistician and Associate Technical Fellow Bob MacLean and Aviana Global Technologies consultant James Bettles, combined their specialties in designing a computer program specifically for predicting out-of-tolerance tools. While using predictive mathematical formulas and computer programs has boomed in a number of industries in recent years, MacLean has worked with predictive models since the 1970s. The main difference is that today’s technology makes it easier to harness facts and figures into useable prediction tools.

Ortman and the lead analyst on his team, Alan Davis, led implementation

of the analytics software at Commercial Airplanes sites. It quickly made a difference, they said. For example, one torque wrench that was taken out of service in Renton, Wash., after it was identified as being out of tolerance would have stayed on the factory floor for up to a year under the old recalibration schedule. In all, more than 40 SOOT tools were discovered and a significant number of less seriously out-of-tolerance tools were discovered as well, Ortman and Davis explained.

Using the predictive software program and its findings has led the Metrology team to help mechanics calibrate their tools more often than before, Onustack said. At the same time, there is a related effort to remove more than 13,500 older tools, which are at greater risk for creating tolerance problems, from Commercial Airplanes factories by the summer.

“Right now, we’re choosing to err on the side of reducing risk as much as possible,” Onustack said, adding that the Metrology team has developed other tools to help users identify specific poor-performing tools so they can remove them from service. Also, commonality among tools is increasing, and the company is planning to place torque-checking devices closer to mechanics’ work areas at Commercial Airplanes sites.

Meanwhile, Lorang’s team is trying to make this project repeatable

throughout Boeing’s businesses. Commercial Airplanes is sharing what it has learned as well, Ohman said.

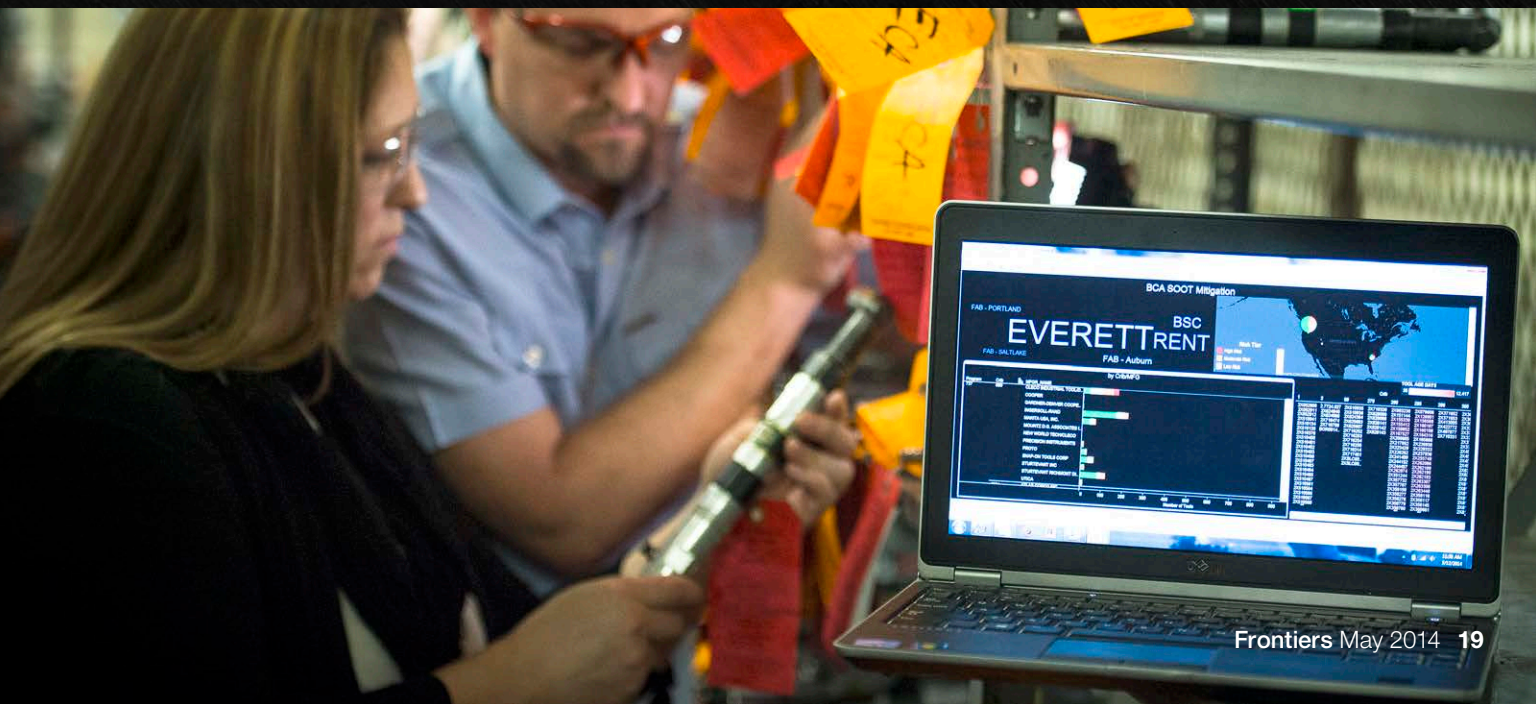
“Our SOOT team is working on making analytics a permanent part of the tool management system,” Ohman said, “and we are also sharing our discovery with Boeing Defense, Space & Security to see if they may be able to benefit from the use of advanced analytics.”

As Commercial Airplanes sites from Everett, Wash., to Salt Lake City to North Charleston, S.C., use the predictive program to find problem tools, more information is gathered, Ortman added.

“As we discover new insights, we can add substantial new data to fine-tune this,” he said. “All signs point to this being the right thing to do for the business. We’re remedying the potential for damage and reputational risk by doing this.” ■

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**PHOTOS:** (Clockwise, from far left) Lohnes inspects a motor in a tool storage area at the Everett, Wash., factory; Wingrove, left, and Davis refer to a laptop for a list of at-risk tools by tool family and location; bins full of worn-out and out-of-tolerance screw guns, nut runners and torque wrenches are destined for destruction after being retired from the factory floor in Everett.





# DEPTH O

## Field service representatives are the face of Boeing to customers

By Bill Seil

**A**round the world and around the clock, their primary mission is to be where they are needed, when they are needed, to support Boeing customers. Their careers are as varied as the company's diverse global base of airline, space and military customers.

Barrie Grubbs, for example, is a former U.S. Marine helping maintain the Bell Boeing MV-22 Osprey for the U.S. Marine Corps. He's based in North Carolina. Meanwhile, in Buenos Aires, Argentina, Chris DiVito is supporting the airline Aerolineas Argentinas, which has a growing fleet of Next-Generation 737s.

Both are Boeing field service

representatives, a dedicated group of employees with special skills and numbering in the hundreds.

"Field service representatives are the face of Boeing and our customers depend on them to get the information they need," said Eric Anderson, director of the Logistics Services Capability Center for Global Services & Support, based in St. Louis.

"A lot of times, it's not a matter of waiting for the customer to ask," Anderson said. "It's knowing what the customer is doing and anticipating what they need."

Global Services & Support, part of Boeing Defense, Space & Security, has approximately 350 field service

"We work toward ... situations where the customer is satisfied at the end of the conversation. We build bridges."

—Sue Fullington, director of Field Service for Commercial Airplanes



# FFIELD

representatives based at nearly 115 global locations.

Commercial Aviation Services, part of Boeing Commercial Airplanes, has more than 330 field service representatives based at more than 60 locations around the world providing on-site technical support to airline customers who operate Boeing jetliners. Their knowledge must extend to all Boeing airplane models, including the 787 Dreamliner.

“The reps are the customers’ advocates back to Boeing,” said Sue Fullington, director of Field Service for Commercial Airplanes and based in the Seattle area. “They’re also Boeing’s advocates

when working with customers.”

Some Boeing subsidiaries also have their own field service representatives to help customers. Insitu, for example, maker of the unmanned aircraft ScanEagle, has more than 190 full-time field service representatives. They also have access to supplier-provided field representatives to supplement their own workforce. Insitu currently has nearly 200 full-time and supplier-provided field representatives deployed around the world.

Field service representatives—both military and commercial—sometimes go to rugged, even dangerous parts of the world. Some even are asked to go to areas where battles are taking place.

Grubbs, the Marine Corps veteran, is often deployed with the MV-22 crews to combat zones. In one case, he was part of a team that was sent to Afghanistan to recover an MV-22 that was damaged in the field. A few days after the team arrived and repairs were completed, the tilt-rotor Osprey was flown back to base.

“I consider it a privilege to go on

PHOTOS: (Portraits, from far left) Field service representatives Irina Turanskaya in Kiev, Ukraine; Mike Snover on a mezzanine in Dublin, Ireland; Eunjeong Bahn outside a hangar in South Korea; Barrie Grubbs. ASSOCIATED PRESS (Products, from far left) A Boeing 737 in flight; a 787 Dreamliner in Japan Airlines livery; an MV-22 Osprey at night. BOEING

these missions, because I'm going with the Marines," said Grubbs, who is based out of Air Station New River in Jacksonville, N.C. "I want them to know that there are people back home who are willing join them in the things they do to protect our freedoms."

Another field service representative, Alain Garcia, supports ground-based pilot training for the Singapore Fighter Wing, which takes place, under contract, at the Cazaux Air Base in France. He helped develop the curriculum that is used in the training. While serving as a fighter pilot in the U.S. Navy, Garcia flew numerous combat missions in Afghanistan and Iraq.

"I have a background in tactical flying, which gives me credibility with the Singapore pilots who are conducting the training, as well as pilots who are being trained," Garcia said. "We can all relate to one another, which makes it easier for us to work together and understand each other."

DiVito, the field service representative in Buenos Aires, said her daily routine includes checking on airplanes in need of maintenance, discussing issues with Argentine engineers over a hot cup of yerba maté tea and communicating with her Boeing colleagues in the Seattle area. Some of her greatest challenges have involved AOGs (Airplane on Ground), in which a plane is unable to fly due to some problem.

"It often involves waking up in the middle of the night, and working through the night and on weekends," she explained. "You work until it's done—until the airplane is flying again."

Takeshi Yamamoto, based in Tokyo, supports Japan Airlines' 787 Dreamliners and Skymark Airlines' Next-Generation 737s. He joined Boeing in 2010, after previously working at Japan Airlines. He finds that his experience with the airline has helped him provide better customer support. He has handled difficult issues, including early problems with 787 batteries.

"In field service, frequent communication is important," Yamamoto said. "Even when there are no technical issues, you need to go to the customer and have conversations. Listen carefully and try to put yourself in their shoes."

Boeing Commercial Airplanes has a Field Service organization within Commercial Aviation Services. Field service representatives support all Boeing jetliners, including some out-of-production models.

When hiring a field service representative, Fullington said she looks for people who have a good technical knowledge of the airplanes as well as an understanding of airline customers. They must have a passion for solving customer problems and experience in working within the company's various networks.

"We look for people who know how airlines operate because there are times when we get in the middle of some very intense discussions between Boeing and a customer," Fullington said. "We work toward win-win situations where the customer is satisfied at the end of the conversation. We build bridges."

Field service representatives with Global Services & Support, unlike Commercial Airplanes representatives, support specific programs and generally focus on individual products.

While many Global Services & Support field service representatives have military experience, others developed their experience through a range of past Boeing assignments.

"In many cases, our reps are stationed side by side with customers in war zones," Anderson said. "And like our customers, they are in harm's way. They are committed to doing whatever it takes to support our customers' missions—anytime, anywhere." ■

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## Gary Gruwell

SUPPORTS MISSILE DEFENSE AGENCY  
BASED AT FORT GREELY, ALASKA

Located southeast of Fairbanks, Alaska, Fort Greely is home to grizzly bears, moose, wolves—and a ground-based missile defense complex to defend the U.S. against long-range ballistic missile attacks.

Winter temperatures tend to hover a little below zero degrees Fahrenheit (-18 Celsius), though they have, from time to time, dropped to 60 below (-51 Celsius). High winds create snowdrifts and can cause extreme wind chills. Daylight is scarce in the winter, but plentiful during the summer.

Gary Gruwell, a Boeing field service representative, has lived at Fort Greely since 2002, part of the Boeing team there that supports the Ground-based Midcourse Defense system, for which Boeing is the prime contractor. His customer is the Missile Defense Agency, part of the U.S. Department of Defense.

"I get to live a remote, rural-type lifestyle and still go to work each day in a challenging aerospace job," Gruwell said. "That doesn't happen too often."

Gruwell, a Global Services & Support representative at Fort Greely, is responsible for maintaining power production and distribution. He is also involved in maintaining specialty equipment used at the site. While the complex has access to commercial power, it has two Boeing-designed

power plants for use in emergencies.

He leads a team of 15 electricians, generator technicians, and power control and monitoring system operators. They monitor system health and operations around the clock, 365 days a year. They try to schedule projects so outdoor work takes place in warmer weather, but that's not always possible.

When Gruwell first went to Fort Greely in 2002, his job was to help convert a closed U.S. Army base into a missile defense complex. Today, the base is in full operation, with modern facilities. There are also amenities for the people working there, including a well-stocked PX (post exchange, or store) and a gymnasium.

About a year ago, Gruwell bought a hay farm, which he operates as a side business. He also maintains a kennel for older rescue dogs that have difficulty living in the cold climate. He is preparing to build a greenhouse on his property, which he will use for gardening. Sometimes he travels to California to see his grown children and other family members.

"In the summer, if I'm not on the farm or with the dogs, I'm off hunting, fishing, rafting or backpacking," Gruwell said. "I really love our small community, and spending time with the people who live here." ■

PHOTO: ASSOCIATED PRESS



## Eunjeong Bahn

SUPPORTS F-15K FIGHTERS IN KOREA  
BASED AT DAEGU AIR BASE, SOUTH KOREA

**A**s a former logistics officer in the Republic of Korea Air Force, Eunjeong Bahn knows the importance of fleet readiness.

Today, she is a Boeing field service representative supporting the Korean air force's F-15K program at Daegu Air Base. Her primary responsibility is fulfilling the company's Performance Based Logistics agreement with the air force, in which Boeing uses forecasting methods to ensure that parts and repairs are available when needed. This keeps the fleet operationally ready to defend the country.

"For the Republic of Korea Air Force, it's a whole new concept in logistics support," Bahn said. "It's based on measurable performance to ensure that the level of support needed by the customer is met."

A chief challenge of the job is setting priorities. Each day she receives numerous requests for support and must decide which are

the most important. That's where her background as a captain in the Republic of Korea Air Force comes in.

"Readiness is vital, so everything is considered urgent," she said.

"That's a big challenge for me, but my understanding of our customer and their needs helps a lot."

She can usually email the Global Services & Support team in St. Louis and have an answer in the morning. But in some cases, issues have to be resolved by phone.

Bahn said the South Korean culture focuses heavily on relationships, and this begins by building trust. In her case, she had to find a way to transfer the relationships she developed as an air force officer to business relationships in her role as a field service representative.

Her hobbies include playing golf and various forms of dance, including the tango. But her life recently became busier with the birth of her first child. Her husband, who is in the Korean air

force, recently transferred to Daegu Air Base to train as an F-15K pilot. Bahn also is pursuing a master's degree in business administration.

Bahn decided in high school that she wanted to work in aerospace, and that the military was the best path to pursuing her career. So she graduated from the Republic of Korea Air Force Academy and went on to active service as an air force logistics officer. While in the air force she went to the United States to take logistics-related courses through the U.S. foreign military training program. She also participated in a U.N. peacekeeping mission in Lebanon.

She joined Boeing in 2009 and began her current field service assignment in 2011.

"Supporting Korea's F-15K's on behalf of Boeing is a wonderful opportunity," she said, adding: "Some people complain about the sound of the F-15K's engines. But hearing it makes me so happy." ■

PHOTO: ASSOCIATED PRESS





## Mike Snover

RECENTLY SUPPORTED RYANAIR IN DUBLIN, IRELAND  
NOW BASED IN BEIJING

During his 18 years as a field service representative, Mike Snover and his family have experienced life on four continents.

He started out supporting Delta Air Lines in Atlanta. From there, he moved on to a six-year assignment in Buenos Aires, Argentina, and then a five-year assignment in Taipei, Taiwan.

Prior to beginning a new assignment in Beijing last month, he was stationed in Dublin supporting Ryanair. The low-cost carrier operates a fleet of 300 737-800 Boeing jetliners, all with the same specifications.

"Probably the neatest thing about the job was being in a position to find and report any problems with the airplane very early on," Snover said. "That's information that's valuable to the fleet as a whole."

Snover supported Ryanair with two colleagues based in Dublin and London Stansted Airport. His day would begin with a meeting with airline representatives, where they'd conduct a review that covers every airplane in the fleet. Afterward, he would follow up on any issues that needed to be addressed and handle email traffic—much of which would arrive overnight from Boeing Commercial Aviation Services colleagues in the Seattle area. The field service representatives

also would make rounds, in which they'd meet with key management personnel. By midafternoon, calls would start coming in from the home office in Seattle, consuming most of their time until around 6 p.m.

While technical skills are important, Snover said building relationships with customers and developing trust are essential to doing his job.

Snover, with his wife and two daughters, has found time to explore the regions where he has been based. He said they especially enjoyed living in Buenos Aires, and visiting Latin American sites.

Snover's main passion is downhill skiing, and he has taken his family on ski outings in four continents.

Snover noted that while growing up, his two daughters never attended school in the United States. His assignment in Atlanta concluded when they were 3 and 5 years old.

"While they gained a lot from being educated around the world, they've missed out on American culture," he said. "So we're asking them to complete their education by going to college in the United States, and they agreed."

His oldest daughter is now attending a university in Washington state. ■

PHOTO: ASSOCIATED PRESS



## Orian Steen

SUPPORTS INSITU CUSTOMERS  
ASSIGNMENTS INCLUDED IRAQ AND AFGHANISTAN

When Orian Steen was a flight engineer in the U.S. Air Force, he could look out the window of his aircraft and get a good sense of his surroundings.

Today, as a field service representative for Insitu, he flies a very different kind of aircraft. His only view comes from a camera that's pointed at the ground.

Insitu is a Boeing subsidiary in Bingen, Wash., that produces unmanned aircraft systems (UAS), such as ScanEagle and Integrator.

"At Insitu, our role is different from the typical field service representative," Steen said. "Most reps are out there helping customers support and maintain Boeing aircraft. In our case, we're flying the aircraft ourselves."

In most contracts, Insitu retains ownership of the unmanned aircraft and sells customers the video taken during surveillance missions. But there are cases where a military customer will buy, and fly, the equipment. In those cases, Steen and his colleagues serve a more traditional field service role.

Steen has worked for Insitu for five years and been deployed to Iraq, Afghanistan and a U.S. Navy ship, and had a special assignment in the Netherlands.

In the Netherlands, Steen spent two months supporting the use of ScanEagle by the Dutch Ministry of Defence.

While supporting the U.S. Marines in Afghanistan, Steen had about 50 Insitu field service reps assigned to him. Operating with multiple aircraft from various sites, they flew thousands of hours each month. In some cases, they operated from large air bases with modern amenities. In other cases, they were at isolated locations surrounded by wire fences.

Steen said one of his most interesting assignments was working from a U.S. Navy destroyer. After 10 years in the U.S. Air Force, he had never served on a Navy ship before.

"I enjoyed it," he said. "On the ship, it was a different lifestyle, with customs and courtesies that were new to me."

When he's not deployed, he spends as much time as possible with his wife and children.

In his spare time, Steen enjoys riding his motorcycle and flying remote control helicopters. But why would someone who flies sophisticated unmanned aircraft want to fly a toy? The Air Force veteran still enjoys the freedom and spontaneity of old-fashioned flight.

"Flying a remote controlled helicopter involves a lot more manual flying than an unmanned aircraft, which is highly automated," he said. "It's relaxing just to pick up the controls and fly it around." ■

PHOTO: JEREMY PHILLIPS/INSITU



## Irina Turanskaya

SUPPORTS AIRLINES OPERATING BOEING JETLINERS  
BASED IN KIEV, UKRAINE

In 1994, Irina Turanskaya applied for a six-month position supporting Boeing Commercial Airplanes' field service representative in Ukraine.

At that time, she didn't have any experience in aerospace. But she did have a Ph.D. in linguistics.

Turanskaya got the job, in part because the company's airline customers knew little English and the field service representative didn't speak Ukrainian.

"I had worked as a teacher of English and French, and I speak Ukrainian and Russian," she said. "Primarily, I was hired as an interpreter, and to assist the rep with everything else that needed to be done."

In 1998, she was asked to come back to the job, this time on a full-time basis. Turanskaya soon developed a passion for the work. But to continue, she realized she would have to take her education in a dramatically new direction.

"I needed some technical knowledge, so I enrolled in a three-year course in mechanics at the National Aviation University in Kiev," she said.

After serving in a supporting role for six years, Turanskaya was promoted to field service associate for Ukraine.

Today, she supports five airlines: Ukraine International Airlines, UT Air Ukraine, Kharkiv Airlines, Bravo Airways and Air Onix. Boeing airplanes in local fleets primarily include Next-Generation 737s, 737 Classics and 767 jetliners.

She generally starts her day at 8 a.m. and works until around 6 in the evening—although she keeps her computer on until after 10 p.m., just in case important messages come in. There is a 10-hour time difference between Kiev and the Seattle area, where her Commercial Aviation Services colleagues are headquartered.

"Evenings are the best chance for

me to talk with people in Seattle and have answers ready for my customers in the morning—especially on urgent issues," she said.

Often, she uses her language skills to help her customers find help, even if it's not directly related to her job.

Turanskaya does most of her work at Boryspil International Airport, where she is close to the airline engineering departments.

In her spare time, Turanskaya has several hobbies and avocations. She is taking classes in Gestalt psychology, which helps her establish balance in work, relationships and daily life. She also has been active in Toastmasters. She enjoys cooking, including Italian, French and local cuisine.

"I really love cooking," she said. "I have so many cookbooks at home. When I'm in the kitchen I just go crazy." ■

PHOTO: ASSOCIATED PRESS

# MORE FOR LESS

Boeing and its suppliers work together to cut costs and be more productive and efficient

By Liz Verdier and Antonella Bellman



Inside the fuselage of a 737-900ER (Extended Range) on the Renton, Wash., assembly line, Boeing technical designer James Pounds watched—a smile of satisfaction moving across his face—as a mechanic prepared to make the first installation of a redesigned part for the airplane’s ventilation system.

With the whir of an electric screwdriver, the mechanic fastened the part securely to the aluminum track along the fuselage frames, the attached hose snaking down. The task completed the first phase of the project.

Installing the part took no more than about 30 seconds. But getting to that moment in the Renton factory several weeks ago was the result of a brainstorming session two years earlier—and lots of work in between by Boeing and one of its suppliers.

“It is really satisfying to be able to save Boeing so much money—and now we want to find even more projects like this,” said Pounds, a 737 mechanical systems design engineer.

He was part of that initial brainstorming group. It began as an effort by the 737 Environmental Control Systems team to find a way to reduce cost and weight on the best-selling airplane.

Working with longtime supplier PECO Astronics of Portland, Ore., which makes the 737 Environmental Control Systems, a Boeing team came up with an out-of-the-box solution. What had been a three-nozzle air distribution system on the 737 will be changed to one with only two nozzles. The result? Boeing expects an eventual savings of about \$4 million a year, along with a weight reduction of 26 pounds (12 kilograms) per plane when the second phase of the project installs in 2015.

It’s but one example of the value being created around the company by the Partnering for Success program.

“We can’t implement a true cost savings for our customers unless our supply chain is able to realize the same improvement in quality and efficiency in their production systems. That is

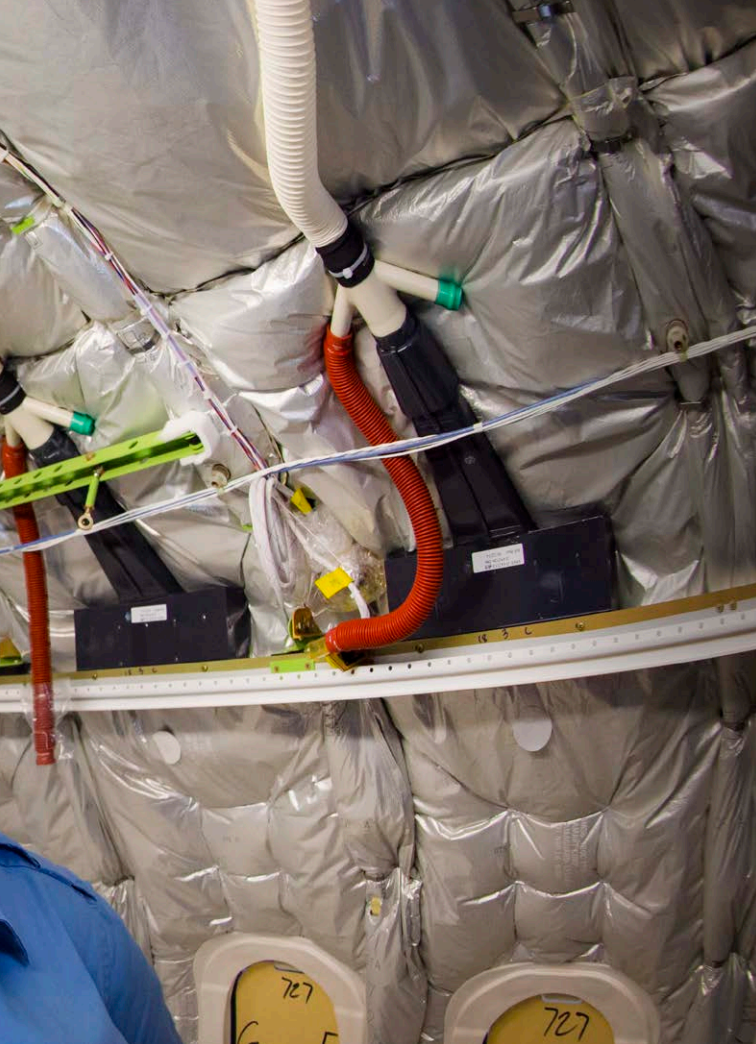
what Partnering for Success is about,” said Mike Zyskowski, director of Engineering with Commercial Airplanes Supplier Management.

The supply chain accounts for about two-thirds the cost of Boeing products and services, so suppliers must be as vigilant as Boeing in looking for ways to reduce costs and streamline their operations, he and other Boeing leaders say. The reward for those who do, they point out, is a huge opportunity for growth in the years ahead.

PECO, the 737 supplier, has been doing just that—working with Boeing to reduce costs and improve efficiencies.

Through initial PECO collaboration with Boeing, some 100 component part numbers for the 737 ventilation system were reduced to 10, said Dave Freund, PECO’s vice president.

“It’s been encouraging to our team members to be able to take ideas up to Boeing knowing they’re getting legitimate review and resources when the project makes sense and there’s



“We can’t implement a true cost savings for our customers unless our supply chain is able to realize the same improvement in quality and efficiency ... That is what Partnering for Success is about.”

—Mike Zyskowski, director of Engineering with Commercial Airplanes Supplier Management

a value proposition,” Freund said.

Jack House, Boeing’s Partnering for Success enterprise leader, said achieving mutual cost reduction goals is everyone’s business. At Boeing, it means first-time quality and design efficiencies that improve production performance while reducing costs, he explained.

House is vice president of Supplier Management for Boeing Defense, Space & Security, where coordination with a supplier across business units provided the most affordable pricing solution for an F-15 program customer.

Fighter aircraft components such as radar systems are technically sophisticated and can be very expensive to purchase, especially if they’re procured individually. A Boeing team led by Sharon Loetscher, a Supplier Management senior manager, worked with colleagues in Boeing Military Aircraft and Global Services & Support to integrate their needs into one set of requirements. The team then worked with supplier Raytheon to negotiate the best possible

production, spares and retrofit pricing in support of the customer’s fleet.

“The economies of scale were substantial,” Loetscher said. “We were able to secure significant savings for the package.”

But the teamwork doesn’t end there.

Representatives of the F-15 and F/A-18 programs are making the most out of certain commonalities of these aircraft, including their work with Raytheon. By focusing on common designs and support staff, as well as common companies within their supply chains, the F-15 and F/A-18 teams were

PHOTOS: (Far left) Designer James Pounds stands in a 737 cabin, where the first parts of a lighter, simpler air distribution system—developed with supplier PECO Astronics—are being installed. **MARIAN LOCKHART/BOEING** (Insets) PECO employees Dave Freund (top left), Fred Blake (top right) and Julie Lee (above) inspect parts to be sent to Boeing. **JIM ANDERSON/BOEING**

able to capitalize on synergies across the platforms and production lines.

“And that created significant savings for our customers,” said Tim Myers, supplier program manager.

Partnering for Success, however, is not just about aircraft parts. It’s about finding more efficient ways of doing business everywhere—even at the gas pump.

Commodity costs, such as jet fuel, play a big part in the cost of Boeing products. Boeing consumes nearly 50 million gallons (190 million liters) of jet fuel each year.

“It’s hard to believe, but we didn’t have a single contract for the company when it came to buying jet fuel,” said Mike Broughton, procurement agent from Shared Services Group Supplier Management, the business unit

responsible for purchasing all non-production goods and services.

Instead, he said, Boeing had 10 different contracts spread across Commercial Airplanes, Defense, Space & Security, and Engineering, Operations & Technology. Without one contract for the enterprise, each of the business units was buying jet fuel at different prices and under different contract terms.

So a Boeing team was brought together to figure out a better and cheaper way.

The result: one contract covering the entire company that reduced the number of suppliers from about 40 to a handful—and saved millions of dollars almost immediately. The team also negotiated coverage for an additional 28 Boeing sites around the world.

“It’s amazing what we can

accomplish when we work with our supplier partners,” Broughton said. “Partnering for Success has brought the relationships we built with our suppliers to a whole new level.” ■

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*To see a video about PECO’s work for Boeing, visit [boeing.com/frontiers/videos/may14](http://boeing.com/frontiers/videos/may14). For more about Partnering for Success, see the Leadership Message in the March 2014 issue of Frontiers.*

PHOTO: Procurement agent Sheri Sintzel, left, and procurement manager Bob Madigan review information about the F-15. To streamline how it works with suppliers on fighters such as the F-15, Boeing has integrated its needs into one set of requirements. **RICHARD RAU/BOEING**



## CUSTOMER PROFILE

# DREAM CONNECTIONS

Kenya Airways will use Dreamliner to help connect Africa to the world, and the world to Africa

By Daniel Mosely and photo by Paul Gordon



Last month, hundreds of Kenya Airways employees welcomed the airline's first 787 Dreamliner at its home base of Jomo Kenyatta International Airport in Nairobi.

The 787, the first of nine planned for the carrier's fleet, arrived from Everett, Wash., after a nonstop delivery flight of 7,800 nautical miles (9,000 miles, or 14,500 kilometers). And no one was more excited by the 787's arrival than Kenya Airways Chief Executive Officer Titus Naikuni.

The airline, known as the "Pride of Africa," is on a mission, according to Naikuni: "Connecting Africa to the world, and the world to Africa." And the 787 is going to help Kenya Airways do just that, he said, by opening new route possibilities for direct service to Europe and Asia.

"The delivery of this airplane opens a new chapter at a very exciting time for our airline," Naikuni said, explaining that the fuel-efficient

787 also will improve the airline's economic performance.

Kenya Airways was founded in 1977 with two leased Boeing 707s and has grown to become one of the leading airlines on the African continent. It currently operates an all-Boeing long-haul fleet of six 767-300ERs (Extended Range), four 777-200ERs and one 777-300ER, with the 787 as its newest addition. On short-haul, inter-African routes, the airline operates a mix of 15 Classic and Next-Generation 737s.

The carrier has adopted a 10-year strategic plan called Project Mawingu to increase its fleet from 44 airplanes to 107 by 2021, and expand destinations from 62 to 115. As part of that plan, the airline took delivery of its first 777-300ER less than six months ago. During 2014, Kenya Airways will add two 777-300ERs and five 787s as it moves forward on its path of ambitious growth. The stream of Boeing deliveries is set to continue in the years ahead, Naikuni said.

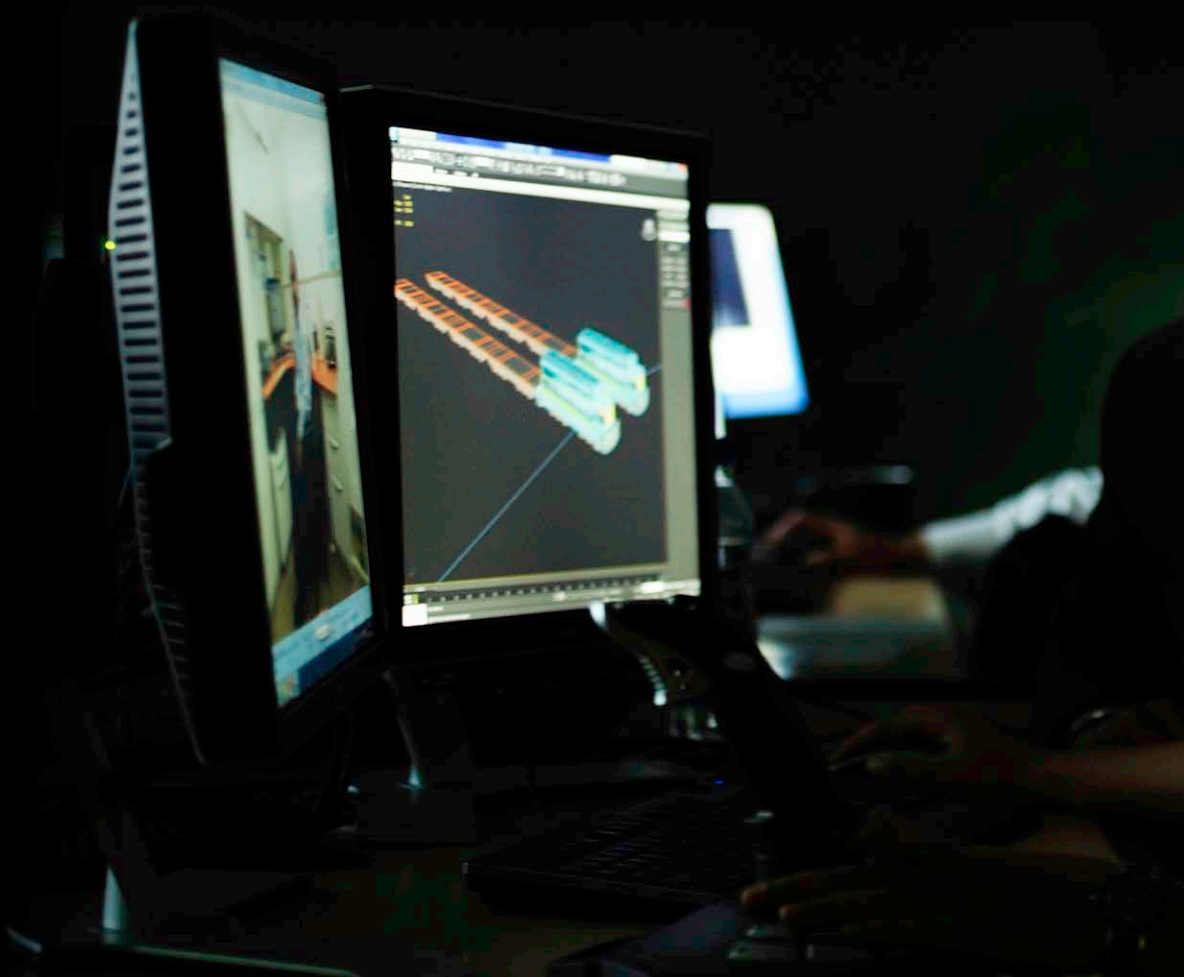
Adding the 787 to the airline's fleet will open up direct, long-haul routes to major cities in Europe and Beijing, he explained, as Kenya Airways explores new markets that will help it achieve its strategic objective and contribute toward the sustainable development of Africa.

"The introduction of direct flights with the 787 to destinations like Paris and Amsterdam will boost key sectors of Kenya's economy such as tourism and horticulture, while the 777-300ER is a perfect fit for our network expansion plans," Naikuni said. "It will enable us to serve our existing markets much more effectively and facilitate the opening of new long-haul routes in the near future." ■

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PHOTO: The first of nine 787 Dreamliners set to join the Kenya Airways fleet is shown at the Everett (Wash.) Delivery Center prior to departing for a celebratory homecoming in Nairobi.

# Fast-forward



**D**uring his three decades in the Republic of Korea Army, Taewoo Kim, or “TK,” helped make sure his nation had the data needed to defend itself from existing and future threats.

Among other responsibilities, he participated in developing C4ISR systems (short for command, control, communications, computers, intelligence, surveillance and reconnaissance) and served as chief of Information Operations development at the army’s headquarters.

Today, he’s still working to ensure his country can protect itself. Only now, he’s doing that job from a Boeing

office building in downtown Seoul.

As the manager of Boeing’s Korea Analysis & Experimentation Lab, Kim leads a team of operations analysts, systems engineers and software analysts tasked with creating virtual environments where they, alongside Korean military leaders, explore the future of combat and weaponry. Here, teams engage in complex analysis of defense scenarios—all simulated—to better understand what and how much capability a customer may need for protection, communication or support systems.

It’s the working together in person, according to Kim, that makes this virtual environment so valuable.

“In Korea, relationships are very important. We want to partner with the

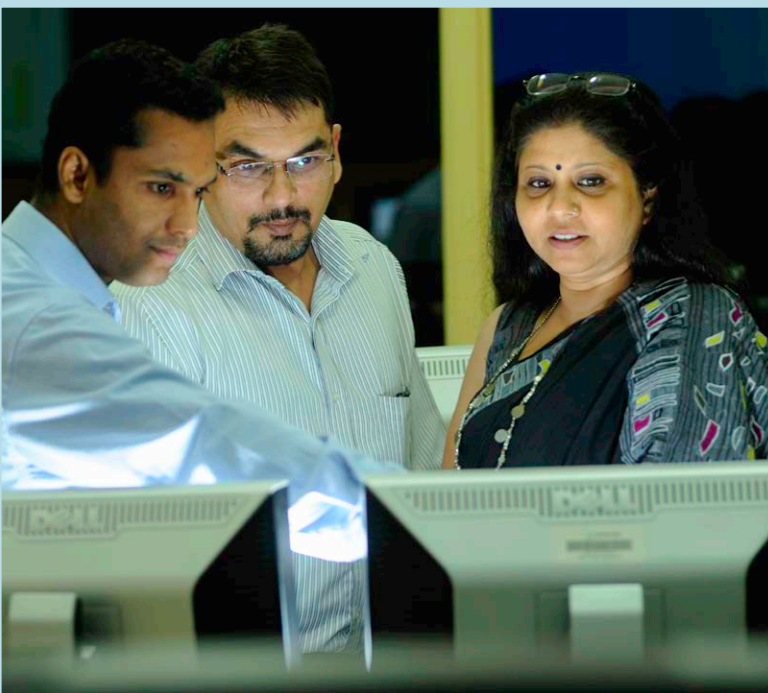
PHOTOS: (Top) Ashwini J S, foreground, and Puneet Loona at Boeing’s Strategic Development & Experimentation Center in Bangalore, India. (Near right) Joshy Sebastian, from left, Ajit Mate and Shaifali Sinha in Bangalore. (Far right) Tongho Sihh (top) at work in the Analysis & Experimentation Lab (bottom) in Seoul, Korea. **ASSOCIATED PRESS**



# to the future

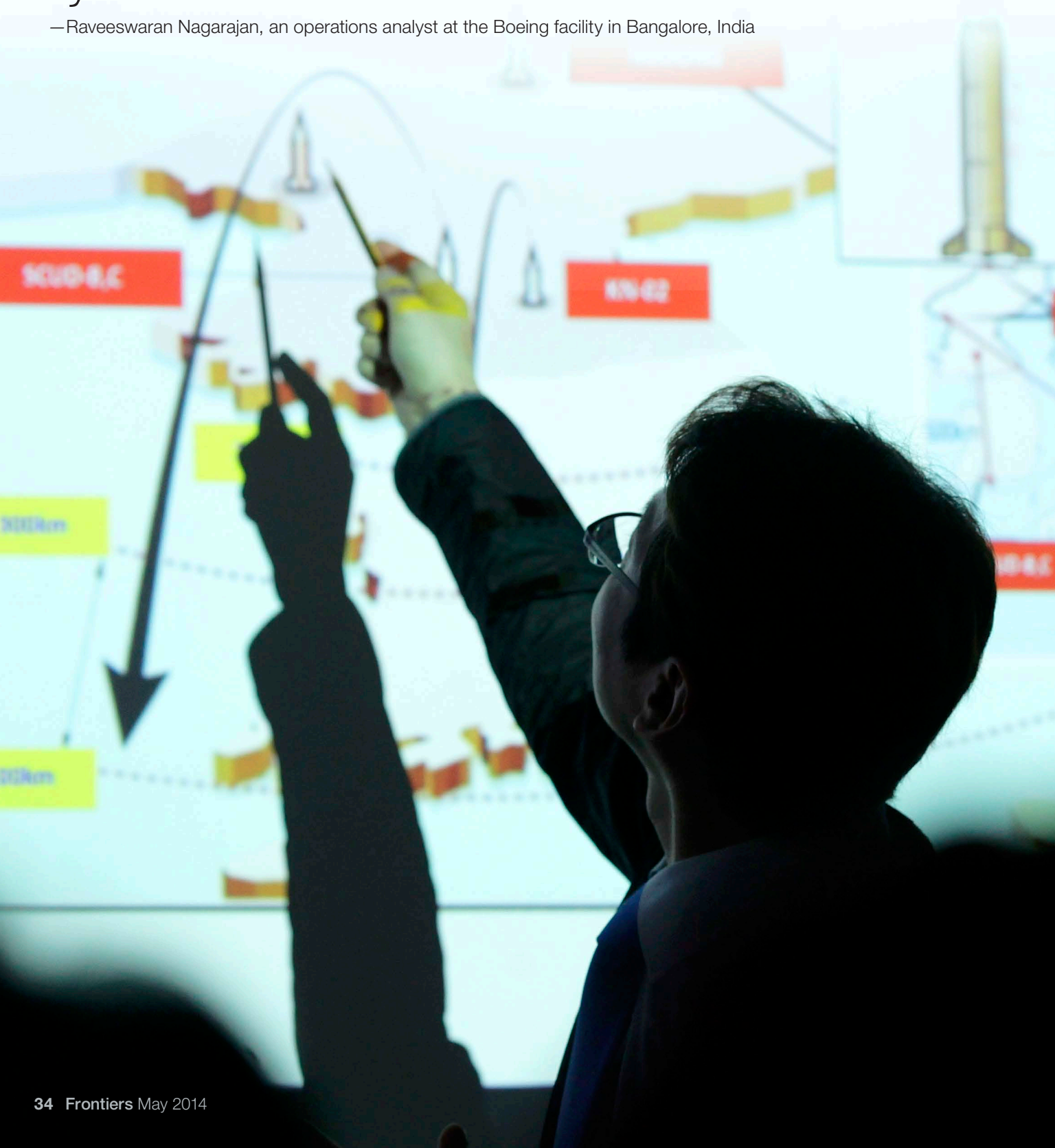
Simulating complex defense scenarios helps Boeing customers prepare for the future

*By Eric Carlson*



“Simulation and analysis allow you to fast-forward the future.”

—Raveeswaran Nagarajan, an operations analyst at the Boeing facility in Bangalore, India



Republic of Korea. We want to grow with them. By helping them understand their capability gaps, we're not just saying that—we're showing them," Kim said.

Boeing teams are engaging with customers at similar facilities around the globe. In Brisbane, Australia; Bangalore, India; Riyadh, Kingdom of Saudi Arabia; and Fleet, United Kingdom; similar scenarios are being "war-gamed" through video projection on large screens, alongside international customers, in otherwise nondescript buildings. All are part of a Boeing effort to help customers better determine everything from the right mix of fighter, aerial refueling and reconnaissance capabilities to the role advanced services and support might play in their plans—and budgets. Exploring scenarios in this way helps ensure mission success for military decision-makers well before the real mission begins.

"Simulation and analysis allow you to fast-forward the future," explained Raveeswaran Nagarajan, an operations analyst in Boeing's Bangalore facility. "You can run exercises, then rewind time to see what happened, what mistakes you have made and how you can improve."

Teaming with these customers

embodies Boeing's global growth strategy, according to Shane Arnott, director of Phantom Works' Strategic Development & Experimentation—International Engagement, the part of Boeing Defense, Space & Security developing these facilities.

The investments Boeing has made—in people, resources and technology—are all evidence, he said, of a commitment to mutual success and directly support the company's activities in each region.

"Having centers in these countries, staffed by local nationals, always available to the customer is a great way to grow trust," Arnott said. "Our staff live and breathe the problems our customers face and are invested in solving them."

No one understands that better than Rahul Bapat. Prior to joining Boeing's team in Bangalore, where he manages the simulation facility, Bapat spent several decades in the Indian Air Force, culminating as a test pilot.

"Having local teams working local problems, in the local language," he said, "helps our customers view our solutions as an indigenous product—a big advantage in our competitive environment."

And through his air force experience, Bapat can relate to the

advantages of visualizing combat scenarios through simulation.

"It helps our customers understand what capabilities they need to invest in—it helps them stay ahead of the game," he said.

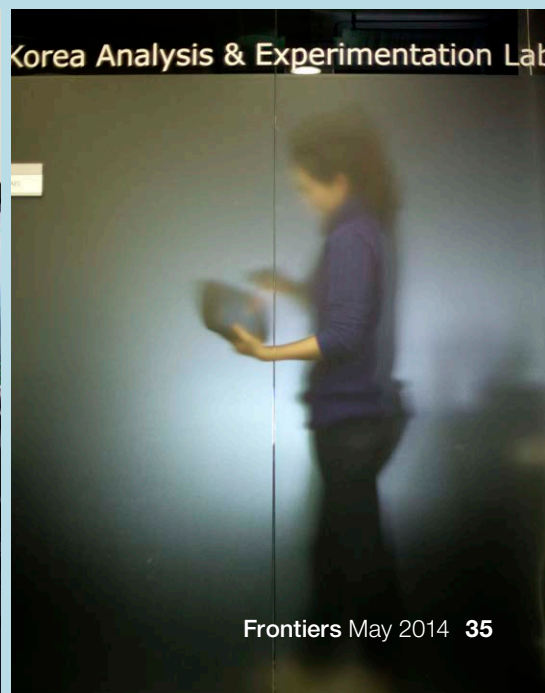
Abdulrahman Al-Huthail, a systems analyst in Boeing's Riyadh facility, agreed.

"These are great tools for understanding and visualizing the problems and related issues—they make it clearer for the customers," he said. "They can see the model or sample a solution before they try to solve the problem."

Although providing these capabilities to customers is key to growing business, manager of the Riyadh team AJ Curtis underscored the mutual benefit of partnering with customers. "We're not here to come in and sell something and then leave," he said. "We're here for the long-term relationship." ■

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PHOTOS: (From far left) Software engineer Hyokyung Kim presents the results of a study in Seoul, Korea; Alharith Almusa, foreground, operates a flight simulator in Riyadh, Saudi Arabia, as Azzam Alrajhi looks on; the Analysis & Experimentation Lab in Seoul. **ASSOCIATED PRESS**





# Expert findings

Meet Boeing's six newest Senior Technical Fellows, who are world-class authorities in their fields

By Candace Barron

**B**oeing people enterprisewide envision, design and build complex, highly capable engineering marvels that improve lives for people worldwide—and captivate imaginations. Leading this effort are members of the Boeing Technical Fellowship, which make up the top 5 percent of the company's talented technical workforce.

At the upper echelon of the Fellowship are the company's Senior Technical Fellows. These individuals are seen not just as aerospace-industry experts but as global authorities in their disciplines. And like their cohorts within the Technical Fellowship, they help Boeing teams overcome technical barriers to meet challenging customer business and mission needs.

This year, the six employees featured here have been installed as Senior Technical Fellows. They represent a diversity of talent and experience, and include the second of two women currently amid this rank.

Boeing employees can contact them, along with every one of their colleagues, on inSite. ■

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## Finding answers **ERIC CREGGER**

While some kids spout baseball stats, as a youngster Eric Cregger quoted performance information of World War II airplanes. By fifth grade, Cregger, a strong math student, had found a calling—aerospace engineering.

Cregger grew up in Virginia and studied engineering at Penn State University. After a brief stint with General Dynamics, he was offered two positions: one in Baltimore and the other in Seattle. Cregger decided to head west, a choice he hasn't regretted.

"I've never picked jobs solely based on what they might do for my career," he said. "Any promotion has come as a side benefit and is based on my ability to jump in, work on big challenges and have an impact."

Each day, Cregger said, he is energized by the fun of solving technical problems. While he worked for many months to resolve 787 side-of-body design issues, he was confident in the eventual outcome. Witnessing the first flight of the 787 Dreamliner from the flight line, he said, was the payoff for long hours spent searching for the fix.

Spurred by an innate curiosity, Cregger said he is driven to figure out answers and solve problems not just locally but across the whole company. "I know I'm hooked when I'm fascinated in just finding the answer simply for the sake of knowing," he said. ■

PHOTO: BOB FERGUSON/BOEING

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## Data to knowledge

### ANNE KAO

Most people wouldn't think of blending the fields of philosophy and computer science, but Anne Kao is not like most people.

Born and raised in Taiwan, Kao traveled to the United States to study the philosophy of language. As a college student before the age of personal computers, Kao was turned off by the technology after watching peers struggle with punch cards and waiting days for data processing.

But after computers took off in the late 1980s, she quickly realized that the machines spoke a language she wanted to understand.

Since 1990, Kao has skillfully blended her passion for philosophy, language and text data to become one of Boeing's foremost experts in data analytics. The essence of Kao's research uses the philosophy of language as it relates to computer data to theorize how people view the world. At Boeing, she developed tools and solutions for an array of applications, including aviation safety, airplane maintenance and reliability, and knowledge discovery and management.

Kao encourages others to take charge of their development plans. "Don't sit around and wait for your next assignment. Chart your own course," she said. "If you work hard and work smart, and have real influence, you can make it, too." ■

PHOTO: MARIAN LOCKHART/BOEING

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## The bigger picture

### ROBERT STUART

Rob Stuart was introduced to an engineering career as a high school sophomore—when his math and physics teachers sat him down and told him that’s what he was going to do when he grew up.

It was an example of how the right teacher at the right time can make a world of difference, Stuart said.

“I wasn’t very good at math, but I had a good mechanical mind,” Stuart said. “Somehow, those teachers, they saw that in me.”

Stuart grew up on a cattle farm in Arkansas. He learned his skills by helping his father fix and maintain machinery. He then earned a degree in electrical engineering from the University of Arkansas.

Since then, Stuart has been living the dream as an aerospace systems engineer at Boeing. Based in Huntsville, Ala., he has done much of his work on a variety of space programs, and is currently the lead for Space Launch System stages product development. He also played a pivotal role in resolving technical issues surrounding the 787’s lithium ion batteries.

“I set myself up to learn a broad base of knowledge,” he said about his career path. “Systems engineering requires an understanding of the bigger picture and being able to think from several technical disciplines. And it’s exciting.” ■

PHOTO: ERIC SHINDELBOWER/BOEING

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## Creativity in technology

### TIM MURPHY

In college, Tim Murphy started out perfectly happy as a Fine Arts major until he took a 100-level class called “electronic music.”

“I thought we were going to be listening to Pink Floyd albums for college credit,” he recalled. “But it turned out to be a pretty serious electrical engineering class.”

The professor was a synthesizer enthusiast, and the class was Murphy’s introduction to theoretical concepts such as frequency and amplitude modulation. It was the first time that he realized engineering could be a creative endeavor.

Even though Murphy was not particularly drawn to math, he engrossed himself in studying technical papers about FM synthesis and in doing computer-generated music experiments. After a couple of years, he changed his major to electrical engineering.

Murphy, now an expert in satellite navigation, communication and surveillance, has spent nearly 30 years in aerospace technology. But he still holds a fondness for the arts. He is a keyboardist in a jazz band that gigs regularly. He plays guitar and sings. His expertise extends to pottery, too.

“But I enjoy being creative with technology as well,” he said. ■

PHOTO: MARIAN LOCKHART/BOEING

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# Engine of advancement

## JAY CARSKADEN

Growing up in Hawaii, Jay Carskaden understood the importance of air travel—a means of connecting his islands in the Pacific Ocean to the rest of the world. It spurred a lifelong passion for aviation in general and jet engines in particular.

Although Carskaden was interested in aerospace early on and was recruited by Boeing during the University of Hawaii's annual engineering career week, his employment was not a foregone conclusion. After missing the deadline for setting an interview time, he added his name to the waiting list and hoped for the best. On the last recruiting day, a spot opened up.

Carskaden joined Boeing Propulsion's "90-day engine study" team where he focused on one small part. "This experience allowed me to observe Boeing's experts in action, as they drove to meet an important and technically complicated goal. By the conclusion of the study, I was hooked," he said.

Now an expert in jet propulsion, Carskaden is a bit more formal these days. His job is to help select engine partners. Once a decision is made and challenges arise, he convenes people who will develop multidisciplinary and system-oriented solutions.

But the love of engines and airplanes he experienced as a child remains. "After all, an airplane without an engine is just a glider," he joked. ■

PHOTO: BOB FERGUSON/BOEING

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## Ideas take flight **JAMES CLAYTON**

James Clayton didn't feel guilty leaving the family farm on the Yakama Indian Reservation in Eastern Washington state to pursue an engineering degree. "Luckily I have two older brothers who stuck around to help out," he said.

After earning undergraduate and graduate degrees in civil engineering and structures and structural mechanics, Clayton knew he wanted to put his education to work at Boeing.

"I grew up in the Northwest, and have always had a fascination with airplanes," he said. "In first grade, I had photos of P-51 fighters on my notebook."

As a young engineer, Clayton started working on the 767 program designing the horizontal stabilizer and the floor support structure for the airplane's fuselage. His work was soon noticed by Boeing Defense, Space & Security, which has requested his assistance on a variety of programs including the P-8A Poseidon maritime patrol aircraft and the KC-46A tanker.

One of the most rewarding aspects of being an engineer, Clayton said, has been watching his ideas take flight from the runway. But the highlight of his career has been working alongside brilliant technical colleagues.

"During my career, I was very fortunate to be a member of groups that had very senior engineers," he said. "I've learned that you have to find those senior folks and learn what you can from them." ■

PHOTO: BOB FERGUSON/BOEING

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# Playing by the rules

Global Trade Controls team works to support sales

and speed production — while ensuring trade compliance

By Marc Sklar





When Kellie Levack's phone rang at 2 a.m., it was a Boeing flight-test crew needing quick answers.

A 787-9 had landed in Kona, Hawaii, to continue remote flight testing after flying from a test site in Australia and the local customs agent wasn't sure how to handle the paperwork.

"The flight-test director got to me and I explained where the agent should sign the document and that we retain the copies," recalled Levack, a trade control specialist with Boeing's Global Trade Controls in Seattle.

A similar phone call to Levack, this time at noon on a Saturday, ensured a Boeing flight crew, waiting in their airplane on an airport tarmac in Chile, didn't take off until they could get a customs agent on the airplane to stamp the paper needed to legally depart that country.

Before they depart on international flight tests, Boeing flight-test directors are handed a very important blue

folder. It contains the documents they need to legally depart for and arrive at each of their stops. Every takeoff on an international leg is an export and every landing on those flights is an import.

If everything doesn't go to plan, or there is a last-minute change in the test schedule, there is one more thing in the blue folder—phone numbers to reach the Global Trade Control specialists who can help whenever needed. Boeing's businesses rely on Levack and her teammates to help move everything from aircraft to parts to marketing materials in and out of all the countries where Boeing operates, and in full compliance with global trade regulations. Levack, in turn, relies on her partners in Supply Chain Logistics, Boeing Test & Evaluation, Supply Chain Security, Corporate Finance and other parts of the company.

Most of the time the import and export compliance work is done well in advance, thanks in part to Global Trade Controls employees embedded within the company's businesses and programs. This allows the group's experts to advise their partners on the most effective export and import strategies as well as make required preparations for moving parts and products. It also can lead to potential new business.

"Our focus is keeping trade compliance a competitive differentiator for Boeing, helping our global business grow," explained Kathryn Greaney, vice president, Global Trade Controls. "We not only want to do an excellent job in meeting trade requirements, but we

"Our focus is keeping trade compliance a competitive differentiator for Boeing, helping our global business grow."

—Kathryn Greaney, vice president, Global Trade Controls, Office of Internal Governance

PHOTO: In the flight deck of a 787-8 test aircraft, Paul Newton, left, a Boeing Test & Evaluation pilot, and Kellie Levack, a Global Trade Controls specialist, review the plane's export and import documentation.

BOB FERGUSON/BOEING

want to do it in a way that saves our company time and money.”

While Global Trade Controls supports Boeing’s day-to-day operations, helping keep parts flowing to busy production lines and exporting products to global customers, it also has to adapt to rapidly changing global trade regulations, Greaney explained.

In the United States, trade rules are undergoing significant change, known as Export Control Reform. The goal, announced by President Barack Obama in 2009, is to ensure the tightest control on key technologies, while revising requirements on other items to help U.S. companies compete globally.

The first major rules changes under these reforms took effect last October. Global Trade Controls was engaged with the government

throughout the development of the rules and spent years preparing for implementation. Since the regulations were implemented, Global Trade Controls and Boeing businesses have been working together on capturing the benefits. For example, some spare parts for CH-47 Chinooks owned by the United Kingdom now can be shipped under what’s called a license exception, meaning less paperwork and faster responses to customer needs.

“Although challenging at first, we are now seeing the benefits of having a less restrictive environment in which to operate, both for hardware shipments and for the use of controlled technology in our program,” said Boeing’s Maggie Ritchie, UK Chinook Programme Export representative.

So, whether it’s an aircraft or

a piece of paper with technical data, the Global Trade Controls team makes sure Boeing can move it around the world where and when it’s needed in compliance with all trade rules.

And, noted Greaney, by always improving how Global Trade Controls supports the company’s businesses, saving time and money, it helps ensure Boeing can continue to compete and grow globally.

Even if it means the occasional 2 a.m. call. ■

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PHOTO: Myiah Johnson, left, a specialist with Global Trade Controls, works with F/A-18 Global Services & Support team members such as Larry Hassel to support F/A-18 customers around the globe. RICHARD RAU/BOEING



## MILESTONES



## IN FOCUS

# Riders on the storm

A Boeing P-8A Poseidon flies over a stormy Washington state coast recently. Based on the 737-800 commercial jet and assembled in Puget Sound factories in Renton and near Boeing Field, the P-8 is a maritime patrol and reconnaissance aircraft developed for the U.S. Navy as a replacement for the Lockheed P-3. The Poseidon is now in full-rate production and 13 had been delivered through the end of April. The Navy plans to eventually purchase 117. India also has ordered P-8 aircraft, with three delivered to date; Australia's government recently approved acquisition of eight P-8A aircraft. PHOTO: LEO DEJILLAS/BOEING





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## **BOEING E BRASIL. OPORTUNIDADES INFINITAS.**

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